

CALIFORNIA

Contact Information

Del Rasmussen, TMDL Section
California State Water Resources Control Board (SWRCB)
1001 I Street, P.O. Box 944213 ■ Sacramento, CA 95812
Phone 916/341-5545 ■ Fax 916/341-5550
email: rasmd@dwq.swrcb.ca.gov
website: <http://www.swrcb.ca.gov/quality.html>



Jim Harrington, State Water Quality Biologist
California Department of Fish and Game (CA DFG)
2005 Nimbus Road ■ Rancho Cordova, CA 95670
Phone 916/358-2862 ■ Fax 916/985-4301
email: jharring@ospr.dfg.ca.gov
California Aquatic Bioassessment Workgroup homepage: <http://www.dfg.ca.gov/cabw/cabwhome.html>

Program Description

Historically, the use of bioassessment data in California water regulations and decision-making has not been a high priority. California's tremendous range of ecological diversity and its equally complex history of land and water use have confounded progress towards implementation of a state-wide bioassessment program. The recent organization of California's Surface Water Ambient Monitoring Program (SWAMP) is providing the impetus to implement a better organized and standardized biological assessment and monitoring program throughout the state. Current concerns over hydroaugmentation and use attainability analyses of targeted waterbodies will foster a greater dependence upon bioassessment information in making informed decisions regarding the protection and restoration of California's streams.

Nine regional boards are essentially independent regulatory entities within the California State Water Resources Control Board (SWRCB). Not all regional boards are at the same level of development regarding bioassessment. One of the first management actions advancing bioassessment in CA was in 1993 when the Lahontan Regional Water Quality Control Board (RWQCB 6) required the use of EPA's Rapid Bioassessment Protocols in a fish hatchery permit. Since that time, the use of bioassessment in water resource decision-making has steadily increased. Presently, bioassessment is used by several RWQCBs for a variety of purposes, including to: assess the impacts of human activities on the biological integrity of streams and rivers; evaluate the effectiveness of restoration efforts, BMP implementation, and permit conditions; develop narrative and numeric biocriteria; establish reference conditions; provide baseline data on the benthic macroinvertebrate community in regional streams; determine the biological health of streams relative to land use in specific watersheds; help identify aquatic life stressors and associated development of ecological indicators in agriculturally dominated and effluent dominated waterbodies; and as an additional tool to NPDES and stormwater permitting to supplement the chemical and toxicological information obtained to address chemical standards.

The California Department of Fish and Game's (CA DFG) Water Pollution Control Laboratory and its Aquatic Biological Assessment Laboratory (ABAL) perform macroinvertebrate sampling and identification, fish surveys, physical/habitat surveys, toxicity testing, sedimentation studies, and tissue and water chemistry. Since 1992, the ABAL has conducted projects covering many different applications of biological monitoring throughout California. These projects have demonstrated bioassessment and promoted the effectiveness of bioassessment in the State.

In 1993, ABAL distributed a set of standard protocols for assessing biological and physical conditions of wadeable streams. The California Stream Bioassessment Procedures (CSBP) are regional adaptations of the national USEPA Rapid Bioassessment Protocols. The DFG, in cooperation with the SWRCB and USEPA Region 9, also established the California Aquatic Bioassessment Workgroup (CABW) to provide input and guidance for the development of a state-wide bioassessment program. The Workgroup was formed in 1994 to coordinate scientific and policy-making efforts towards implementing aquatic bioassessment in California. Members of the CABW consist of biologists from universities, consulting firms, industry, and representatives of state and federal agencies responsible for assessing, monitoring and protecting the biological integrity of surface waters. Through its Steering Committee and annual meetings, CABW participants develop objectives and strategies for implementing aquatic bioassessment in California.

Documentation and Further Information

State Water Resources Control Board. October 2000. *2000 California 305(b) Report on Water Quality*. Sacramento, CA: SWRCB.

Status of Aquatic Bioassessment in California and the Development of a State-wide Bioassessment Program, prepared by the California Department of Fish and Game Aquatic Biological Assessment Laboratory: <http://www.dfg.ca.gov/cabw/status.html>

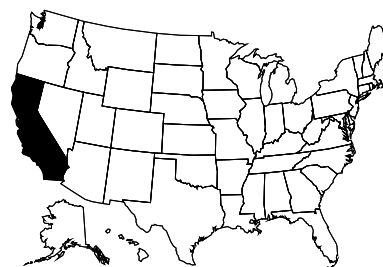
California Stream Bioassessment Procedure (CSBP): <http://www.dfg.ca.gov/cabw/protocols.html>

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Programmatic Elements

| | | |
|---|-------------------------------------|--|
| Uses of bioassessment within overall water quality program | <input checked="" type="checkbox"/> | problem identification (screening) |
| | <input checked="" type="checkbox"/> | nonpoint source assessments |
| | <input checked="" type="checkbox"/> | monitoring the effectiveness of BMPs |
| | <input checked="" type="checkbox"/> | ALU determinations/ambient monitoring |
| | <input checked="" type="checkbox"/> | promulgated into state water quality standards as biocriteria |
| | <input checked="" type="checkbox"/> | support of antidegradation |
| | <input checked="" type="checkbox"/> | evaluation of discharge permit conditions |
| | <input checked="" type="checkbox"/> | TMDL assessment and monitoring |
| | <input type="checkbox"/> | other: |
| Applicable monitoring designs | <input checked="" type="checkbox"/> | targeted (i.e., sites selected for specific purpose) (<i>specific river basins or watersheds</i>) |
| | <input checked="" type="checkbox"/> | fixed station (i.e., water quality monitoring stations) (<i>specific river basins or watersheds</i>) |
| | <input checked="" type="checkbox"/> | probabilistic by stream order/catchment area (<i>specific river basins or watersheds</i>) |
| | <input checked="" type="checkbox"/> | probabilistic by ecoregion, or statewide (<i>specific river basins or watersheds</i>) |
| | <input checked="" type="checkbox"/> | rotating basin (<i>comprehensive use throughout jurisdiction</i>) |
| | <input type="checkbox"/> | other: |

Stream Miles

| | |
|--|----------------|
| Total miles | 211,513 |
| Total perennial miles | 64,438 |
| Total miles assessed for biology* | unknown |
| fully supporting for 305(b) | unknown |
| partially/non-supporting for 305(b) | unknown |
| listed for 303(d) | unknown |
| number of sites sampled | unknown |
| number of miles assessed per site | unknown |

*Due to a comprehensive, statewide overhaul of California's database system, SWRCB was unable to break out numbers for stream miles assessed using biology.

Aquatic Life Use (ALU) Designations and Decision-Making

| | |
|---|--|
| ALU designation basis | Fishery Based Uses, Warm Water vs. Cold Water |
| ALU designations in state water quality standards | Regional Water Quality Boards have a Basin Planning function. Therefore, water quality standards are regionally specific for establishing functional uses, criteria, and implementation plans. |
| Narrative Biocriteria in WQS | Regional water quality standards contain generic statements for the overarching protection of biological communities with an emphasis on, but not limited to, fisheries. Procedures to support narrative biocriteria are regionally specific. |
| Numeric Biocriteria in WQS | none |
| Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria) | <input checked="" type="checkbox"/> assessment of aquatic resources <input checked="" type="checkbox"/> cause and effect determinations <input checked="" type="checkbox"/> permitted discharges <input checked="" type="checkbox"/> monitoring (e.g., improvements after mitigation) <input checked="" type="checkbox"/> watershed based management |
| Uses of bioassessment/biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU | Limited to select studies where biological data are used for management decisions regarding urban development. |

Reference Site/Condition Development

| | | |
|--|--|--|
| Number of reference sites | ~ 200 - 300 total | |
| Reference site determinations | <input type="checkbox"/> site-specific <input type="checkbox"/> paired watersheds <input type="checkbox"/> regional (aggregate of sites) <input checked="" type="checkbox"/> professional judgment <input checked="" type="checkbox"/> other: CA DFG is in the process of developing a more quantitative method of selecting reference sites on a regional basis using GIS land use analyses and quantitative physical habitat measures. | |
| Reference site criteria | under development | |
| Characterization of reference sites within a regional context | <input type="checkbox"/> historical conditions <input checked="" type="checkbox"/> least disturbed sites <input type="checkbox"/> gradient response <input type="checkbox"/> professional judgment <input type="checkbox"/> other: | |
| Stream stratification within regional reference conditions | <input checked="" type="checkbox"/> ecoregions (or some aggregate) <input type="checkbox"/> elevation <input type="checkbox"/> stream type <input type="checkbox"/> multivariate grouping <input type="checkbox"/> jurisdictional (i.e., statewide) <input checked="" type="checkbox"/> other: stream order | |
| Additional information | <input type="checkbox"/> reference sites linked to ALU <input checked="" type="checkbox"/> reference sites/condition referenced in water quality standards (<i>varies by region</i>) <input checked="" type="checkbox"/> some reference sites represent acceptable human-induced conditions | |

Field and Lab Methods

| | | |
|---|-------------------------------------|---|
| Assemblages assessed | <input checked="" type="checkbox"/> | benthos (>500 samples/year; varying levels of rigor) |
| | <input type="checkbox"/> | fish |
| | <input type="checkbox"/> | periphyton |
| | <input type="checkbox"/> | other: |
| <hr/> | | |
| Benthos | | |
| sampling gear | | D-frame; 200 - 400 micron mesh (Sierra Nevada Aquatic Research Laboratory), 500 - 600 micron mesh (California Stream Bioassessment Procedure) |
| habitat selection | | riffle/run (cobble) |
| subsample size | | 300 - 500 count (Sierra Nevada Aquatic Research Laboratory), 300 count (CSBP) |
| taxonomy | | lowest possible, usually genus or species |
| <hr/> | | |
| Habitat assessments | | visual based; performed with bioassessments |
| <hr/> | | |
| Quality assurance program elements | | standard operating procedures, sorting and taxonomic proficiency checks |

Data Analysis and Interpretation

| | | |
|--|-------------------------------------|---|
| Data analysis tools and methods | <input type="checkbox"/> | summary tables, illustrative graphs |
| | <input checked="" type="checkbox"/> | parametric ANOVAs |
| | <input checked="" type="checkbox"/> | multivariate analysis |
| | <input checked="" type="checkbox"/> | biological metrics (<i>return single metrics – use endpoint for each single metric</i>) |
| | <input type="checkbox"/> | disturbance gradients |
| | <input type="checkbox"/> | other: |
| <hr/> | | |
| Multimetric thresholds | | |
| transforming metrics into unitless scores | | bar graph distribution function |
| <hr/> | | |
| Multivariate thresholds | | |
| defining impairment in a multivariate index | | under development |
| <hr/> | | |
| Evaluation of performance characteristics | <input type="checkbox"/> | repeat sampling |
| | <input checked="" type="checkbox"/> | precision |
| | <input type="checkbox"/> | sensitivity |
| | <input type="checkbox"/> | bias |
| | <input type="checkbox"/> | accuracy |
| <hr/> | | |
| Biological data | | |
| Storage | | Central Coast Ambient Monitoring Program (CCAMP) regional database |
| Retrieval and analysis | | CalEDAS |